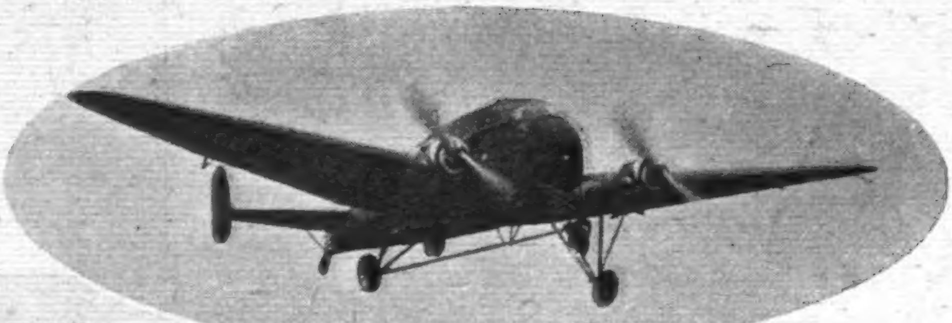
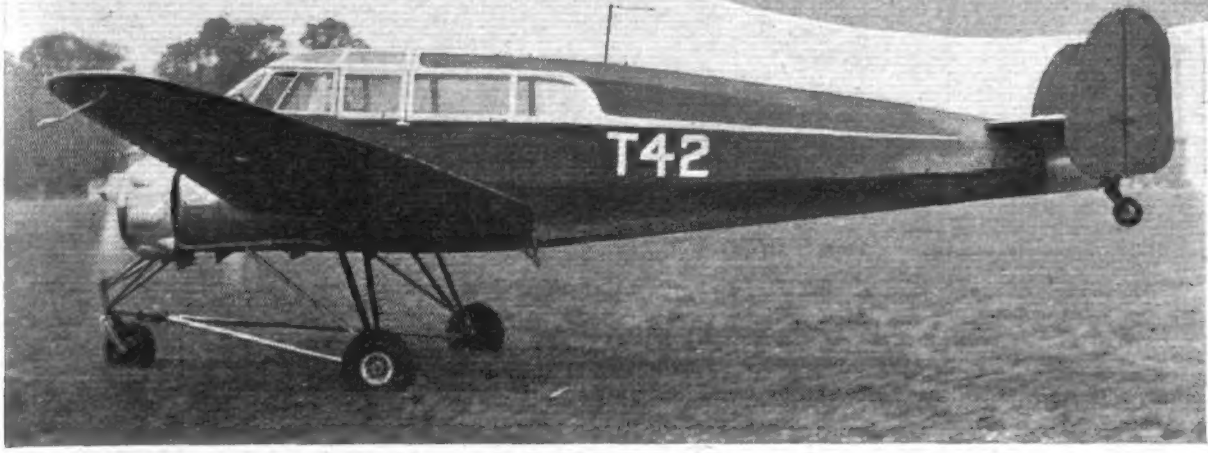
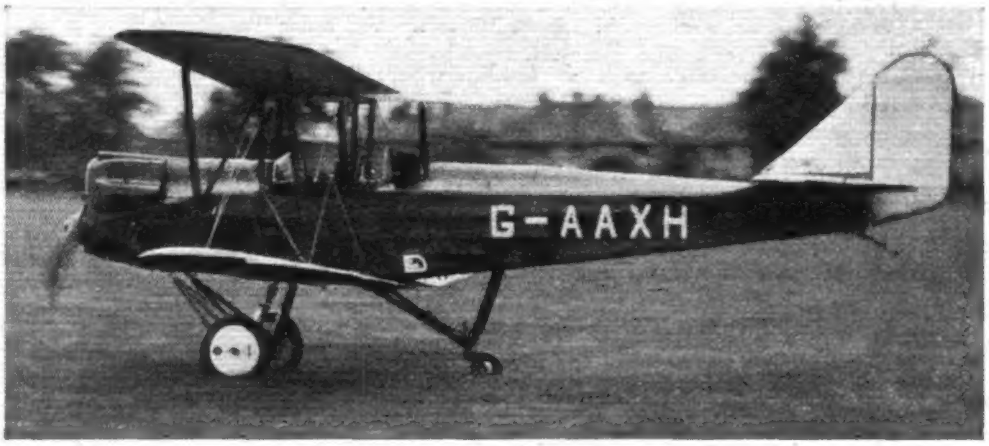
THE SWING of the PENDULUM





Tricycle Experiments : The two upper views show a new Monospar machine adapted for tests. A more unorthodox version is the Avro Avian (below) fitted with the Cowey-Eugster undercarriage, in which the main wheels are far forward and the rear wheel almost under the pilot.

Return of the Tricycle Undercarriage : Extra Drag Makes Retraction Essential

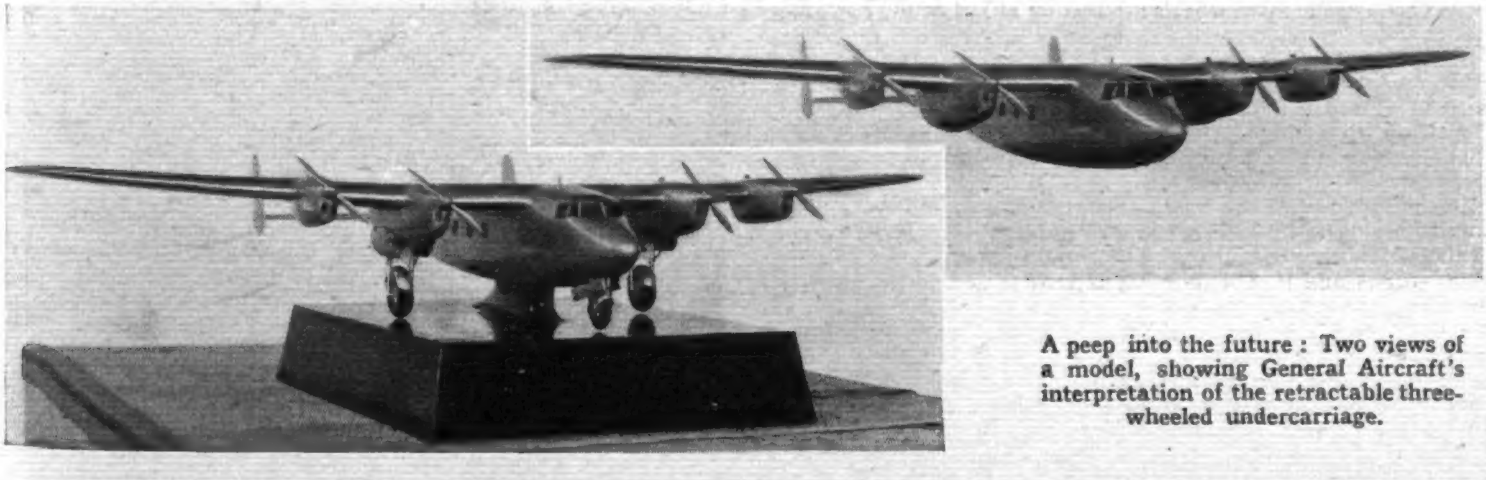


DESIGNERS all over the world are hard at work on producing undercarriages with more than the two wheels which have become the standard equipment of aeroplanes. The schemes being evolved differ greatly in their details, but all depend upon the same fundamental principles; or, rather, all except one. To appreciate the reason for this revival in multi-wheel undercarriages it is necessary to remember that the lift curve of an aeroplane wing is very nearly a straight line from the angle of no-lift to the angle of maximum lift, and that when the angle of maximum lift is exceeded there is a falling-off in lift, the curve dropping again, suddenly with some wing sections and more gradually with others.

When an aeroplane is coming in to land, it is the endeavour of the pilot to bring it in as near to the angle of maximum lift as possible, so that his landing run after touching down may be as short as possible. The flight path has to be very accurately judged so that the attitude and speed of the machine, and its height above the ground are such that at the moment when the speed drops to stalling speed, the "dropping of the tail," which is merely the pilot's deliberate action of increasing the angle of incidence of the wings to beyond stalling angle, causes a loss of lift, increase in drag, and the gentle sinking of the machine on to the ground.

It is, of course, quite obvious that if one of the three main factors involved is not exactly "right," an imperfect landing will result. For example, if the pilot drops the tail while still some ten or twelve feet above the ground, the machine will pancake down and make a heavy landing; possibly something will be strained or even broken. If the height is correct but the speed too great, the machine will "balloon off" when the tail is dropped, and it may be necessary to open the throttle and make another attempt. Even if this does not become necessary, and lift is reduced by raising the tail again, the machine will take a longer landing run than intended.

Admitting that the orthodox two-wheeled undercarriage has been responsible for most of the difficulties associated with landing an aeroplane, the surprising thing is, not that there should be a marked tendency towards a return to the type of



A peep into the future : Two views of a model, showing General Aircraft's interpretation of the retractable three-wheeled undercarriage.